# REPÚBLICA ARGENTINA

INFORME NACIONAL PRESENTADO A LA

ASOCIACIÓN INTERNACIONAL DE

GEOMAGNETISMO Y AERONOMIA –IAGA–

XXIV. ASAMBLEA GENERAL DE LA UNIÓN GEODÉSICA Y GEOFÍSICA INTERNACIONAL – UGGI –

Perugia, Italia, 2 – 13 julio de 2007

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# ARGENTINA REPUBLIC

NATIONAL REPORT PRESENTED TO THE INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY –IAGA–

XXIV GENERAL ASSEMBLY OF THE INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS – IUGG –

Perugia, Italy, 2 – 13 July, 2007

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COMITÉ NACIONAL DE LA UNIÓN GEODÉSICA Y GEOFÍSICA INTERNACIONAL

NATIONAL COMMITTEE OF THE INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS


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BUENOS AIRES. ARGENTINA

2007

Union Géodésique et Géophysique Internationale
International Union of Geodesy and Geophysics

# REPÚBLICA ARGENTINA

## COMITÉ NACIONAL DE LA UNIÓN GEODÉSICA Y GEOFÍSICA INTERNACIONAL (CNUGGI)

# ARGENTINA REPUBLIC

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|---|---|
| ***President:*** | *Cnl. VGM Eng. Alfredo Augusto Stahlschmidt* |
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| ***General Secretary:*** | *Surv. Rubén Carlos Ramos* |
| ***Secretary Assistant:*** | *Surv. Sergio Rubén Cimbaro* |
| ***Treasurer:*** | *MD Silvia Blanc* |

**ADDRESS (Dirección)**
Av. Cabildo 381
(1426) BUENOS AIRES. Argentina
PHONE: +54 (11) 4-576-5576 / 79
E-mail: dir@igm.gov.ar
corina@gl.fcen.uba.ar
rubencarlosramos@yahoo.com.ar

International Union of Geodesy and Geophysics
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# Comité Nacional de la Asociación Internacional de Geomagnetismo y Aeronomía

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**ARGENTINE NATIONAL REPORT 2003-2007**
**XXIV IUGG GENERAL ASSEMBLY**
**Perugia (Italy), July 2 - July 13, 2007**

**INSTITUTION:**
Instituto de Física Arroyo Seco (IFAS)- Facultad de Ciencias Exactas – universidad Nacional del Centro.

**NAME:**
Grupo de Geomagnetismo del IFAS (Geomagnetism Group – IFAS)
Members:
Dra. Ana M. Sinito
Dra. Claudia S. G. Gogorza
Dr. Maracos A. E. Chaparro
Lic. María A. Irurzun

**FIELD WORK**:
Paleomagnetism - Environmental Magnetism

**PUBLICATIONS:**

**ARTICLES**


Chaparro, M. A. E.; Bidegain, J.C., Sinito, A. M., Gogorza, C.; Jurado, C.S., 2003 Preliminary Results of Magnetic Measurements of Stream-Sediments from Buenos Aires Province, Argentina Studia Geophysica et Geodaetica, V 47, 1, Pag. 121-145.

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**ADDRESS :**

IFAS – UNCPBA
Pinto 399 – 7000 Tandil
Argentina
Phone: +54 2293 439660
Fax: +54 2293 439669
e-mail: asinito@exa.unicen.edu.ar
cgogorza@exa.unicen.edu.ar
chapator@exa.unicen.edu.ar
airurzun@exa.unicen.edu.ar

**WEB PAGE :**

http://www.exa.unicen.edu.ar/ifas/paleomag.html

---

**INSTITUTION :**

Instituto de Geofísica "Daniel Valencio"
Departamento de Ciencias Geológicas
Facultad de Ciencias Exactas y Naturales
Universidad de Buenos Aires

**NAME :**

Silvana Evangelina GEUNA

**FIELD WORK :**

Paleomagnetism, Geophysical Prospection

**PUBLICATIONS :**

**ARTICLES**


Iglesia Llanos, M.P., R. Lanza, A. C. Riccardi, S. E. Geuna, M. A. Laurenzi And R. Ruffini, 2003. Palaeomagnetic study of the El Quemado Complex and Marifil Formation, Patagonian Jurassic igneous province, Argentina. Geophysical Journal International, 154(3): 599-617.

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**COURSES** :

2004 **"Metalogenia"**. Postgraduate course by D. Mutti in Universidad de Buenos Aires. 60 hours. 2004.

2004 **"Curso Latinoamericano de Metalogenia UNESCO-SEG 2004".** Coordinated by F. Tornos. CRICYT, Mendoza. 42 hours. August 17-28, 2004.

2004 **"Geofísica Minera".** Postgraduate course by G. Yáñez in Universidad de Buenos Aires. 15 hours. 2004.

**ADDRESS :**

Departamento de Ciencias Geológicas
Facultad de Ciencias Exactas y Naturales
Universidad de Buenos Aires
Ciudad Universitaria Pabellón 2
C1428EHA Buenos Aires
Argentina
Tel. 54-11-45763300 ext 292
Fax 54-11-47883439
geuna@gl.fcen.uba.ar

**WEB PAGE :**

http://ingeodav.fcen.uba.ar/ingeodav.htm

---

**INSTITUTION** :

CASLEO-CONICET

**NAME :**

Marta Mosert

**FIELD WORK** :

Aeronomy

**PUBLICATIONS** :

**ARTICLES**

M. Mosert, R.G. Ezquer, R del V. Oviedo, C. Jadur and S.M. Radicella, 2003. Temporal Variability of TEC using Groundbased Ionosonde Data from Two Argentine Stations. Advance in Space Research, Vol 31, #3, 645-650, doi:10.1016/S0273-1177(03)0030-9, Published by Elsevier Science Ltd. ,Great Britain,.

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**ADDRESS :**
Avenida España 1512 sur, CC: 467, 5400, San Juan, Argentina

**WEB PAGE :**
http://www.casleo.gov.ar

---

**INSTITUTION** :
FCEyN, Universidad de Buenos Aires ; CONICET

**NAME** :
Orgeira, María Julia

**FIELD WORK**:
Environmental magnetism, Quaternary.

**PUBLICATIONS**:

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Orgeira, M.J.; Walther, A.M.; R. Tófalo; C.A. Vásquez ; T. Berquó; C. Favier Dubois and H. Bhonel; 2003. Environmental magnetism in paleosoils developed in fluvial and loessic holocene sediments from Chacopampean Plain (Argentina). Journal of South American Earth Science; 16: 259-274
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**ADDRESS**:
Departamento de Ciencias Geológicas, FCEyN, UBA. Cdad Universitaria Pab II, 1428 Buenos Aires, Argentina. orgeira@gl.fcen.uba.ar Fax 00541157883439 Phono: 00541157883439 interno 44.

**WEB PAGE** :
http://ingeodav.fcen.uba.ar/ingeodav.htm.

---

**INSTITUTION** :
Buenos Aires University - CONICET

**NAME** :
Claudia Beatriz Prezzi

**FIELD WORK** :
gravity, magnetics, paleomagnetism.

**PUBLICATIONS**

**ARTICLES:**

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**ADDRESS** :
INGEODAV, Dpto. de Cs. Geológicas, FCEyN, Universidad de Buenos Aires. Ciudad Universitaria, Pabellón2, 1428, Buenos Aires, Argentina.
E-mail: prezzi@gl.fcen.uba.ar

**WEB PAGE** :
http://ingeodav.fcen.uba.ar/ingeodav.htm

---

**INSTITUTION** :
INGEODAV
Departamento de Ciencias Geológicas
Facultad de Ciencias Exactas y Naturales
Universidad de Buenos Aires

**NAME** :
RENATA NELA TOMEZZOLI

**FIELD WORK :**
GEOLOGY. PALEOMAGNETISM.

**PUBLICATIONS :**


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**ADDRESS :**

Pabellón 2, Ciudad Universitaria,
C1428EHA, Buenos Aires, Argentina.
renata@gl.fcen.uba.ar


---

**INSTITUTION:**

Department of Physics
National University of Tucumán, Av. Independencia 1800 –
4000 San Miguel de Tucumán, Argentina
Phone : +54-381-4364096 (Office)


**NAME**
Dr. Victor Hugo Ríos

Work Group:
Dr. José Fernando Lagori
Dr. Ana Cristina Martinez Pulido
Dr. César Francisco Medina
Ing. Luis Alberto Estrada
Ing. Abel del Valle Herrero
Ing. Antonio Pérez Gómez
Ing. Pascual Padilla
Ing. Osvaldo Zamzoum
Ing. Pablo Alvarez Perdiguera
Lic. Eduardo Francisco Garat
Lic. Inés Margarita Jaen
Lic. Analía Edith del Valle Nahas
Lic. Ana María del Valle Sauvage
Lic. Francisco Rubén Soria
Lic. Blas De Haro
Buf Dante del Valle Pastorelli
Technicians:
Julio César Ríos
Luis Alberto Rongetti

**FIELD WORK** :
Global Ionospheric Forecasting Techniques (GIFT)
Global observation of the ionospheric electronic response to solar events using ground and LEO GPS data.
Radio Beacon Studies of the Ionospheric irregularities with reference to Scintillations and Total Electron Content (TEC).
Ionospheric precursors of earthquakes and VLF/ULF seismogenic phenomena.

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Participationin " Cawses Space Weather Worshop, International Symposium on Equatorial Aeronomy, ISEA-11", Taipei, Taiwan, ROC, May 14, 2005.
Participation in " IAGA 2005 Scientific Assembly", Tolouse, July 18-29, 2005.

**ADDRESS** :
Department of Physics
National University of Tucumán, Av. Independencia 1800 –
4000 San Miguel de Tucumán, Argentina
e-mail : vrios@herrera.unt.edu.ar (Office)
: vhrios@.uolsinectis.com.ar ; victorrios56@yahoo.com.ar (Personal)
Fax : +54-381-4364096

---

**INSTITUTION** :
Independent

**NAME :**
VAN ZELE; María Andrea

**FIELD WORK** :
Geomagnetism and Aeronomy

**PUBLICATIONS:**
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**ADDRESS :**

Geofísica – Dto. De Cs. Geológicas – Fac. de Cs. Exactas y Naturales (UBA) – 1428 Buenos Aires – Argentina

e-mail: avanzele@gl.fcen.uba.ar

**WEB PAGE :**

http://ingeodav.gl.fcen.uba.ar/ingeodav.htm

---

**INSTITUTION:**

Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires. Consejo Nacional de Investigaciones Científicas y Técnicas. Argentina.

**NAME**:

Vizán Haroldo

**FIELD WORK:**

Palaeomagnetism.

**PUBLICATIONS:**

**ARTICLES**

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**ADDRESS:**
Departamento de Ciencias Geológicas. Pabellón 2. Ciudad Universitaria. Buenos Aires.
E-MAIL: haroldo@gl.fcen.uba.ar

**EB PAGE:**
http://introgeo.gl.fcen.uba.ar

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**INSTITUTION :**
UNIVERSIDAD NACIONAL DE LA PLATA
DEPARTAMENTO DE GEOMAGNETISMO Y AERONOMÍA

**NAME :**
JULIO CESAR GIANIBELLI (Geofisico, Jefe de Dto).
IRIS ROSALIA CABASSI (Geofisica)
PATRICIA SALLAGO (Geofisica)
RICARDO EZEQUIEL GARCIA (Ingeniero en Electronica)
NICOLAS M QUAGLINO (Jefe Observatorio Magnético de Las Acacias)
HERNAN SOLANZ (Ingeniero en Electrónica)
DANIEL GARGANO (Técnico)
MONICA MAC WILLIAM (Técnico administrativo)
SEBASTIAN PELLICIUOLI (Jefe Observatorio Magnético de Trelew)
EMILIO PINCIROLI (Observatorio Magnético de Trelew)

**FIELD WORK :**
GEOMAGNETISM, CONNECTION SUN-EARTH, MAGNETIC OBSERVATORIES

**PUBLICATIONS :**
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**MAGNETIC OBSERVATORIES.**

MAGNETIC OBSERVATORY OF TRELEW AND LAS ACACIAS
REVIEW OF TECHNICAL DESCRIPTION
FOR HELIOPHYSICAL 2007 YEAR PROJECT

*INTRODUCTION.*
The Trelew (TRW, Lat.: -43º.27; Long.: 294º.62) and Las Acacias (LAS, Lat.: -35.01; Long.: 302º.31) Magnetic Observatories was both founded by Dr. Leonidas Slaucitajs, TRW in 1957 and LAS in 1961. The firsts operators in both observatories was Profesors Hulda Hartmann and Oscar Sidoti, following in 1959 Prof. Angel Pelliciuoli in TRW up to 1994, and in LAS up to 1997 Oscar Sidoti. Actually the operator of TRW is the technician Sebastián Pelliciuoli, and in LAS are Professor Ezequiel García and Technician Nicolás Quaglino. TRW and LAS magnetic observatories a part of the Dept. of Geomagnetism and Aeronomy (DGA). The head of DGA is the Professor Julio César Gianibelli. In 1993 a convenion of cooperation was established by DGA and the Royal Meterological Institute of Belgium by the Professor Julio César Gianibelli (DGA) y Dr. Jean Rasson (RMI).

TRW and LAS magnetic observatories are in the geomagnetic South Atlantic Anomaly (SAA), is the most big anomaly in Total Magnetic Intensity of the Earth Magnetic Field. The focus of SAA lies in the region covered by the Brasil, Uruguay and Argentine countries. TRW, LAS and Vassouras Magnetic Observatory of Brasil (VSS.: Lat.:-22º.4; Long.:316.35), are in the focus of SAA. Figure 1 shows the position of VSS, LAS, and TRW observatories over the isodinamics map of the IGRF2000, In the year 2003 TRW was incorporated in the INTERMAGNET network. Figure 2 shows the Magnetic Observatories of this network.

*THE HISTORICAL DATA.*
TRW produced from 1957 to 2001, and LAS, from 1961 to 1999, magnetograms of Declination (D) and, Horizontal (H) and Vertical (Z) components, with absolute base line determinations by means of Quartz Horizontal Magnetometer for D and H components and Balance Magnetic for Z, in both Observatories. This magnetograms are in the DGA archives.

*TRW AND LAS DIGITAL MAGNETIC OBSERVATORIES.*
In 1993 Dr. Jean Rasson installed the first digital sensor in TRW. The sensors are in operation and consist of a flux-gate sensors for D and Inclination (I) and a absolute proton precession magnetometer for Total Magnetic Intensity F. The electronic was developed in the RMI with the direction of Dr. Jean Rasson. The temporal resolution is 1 min for all systems.

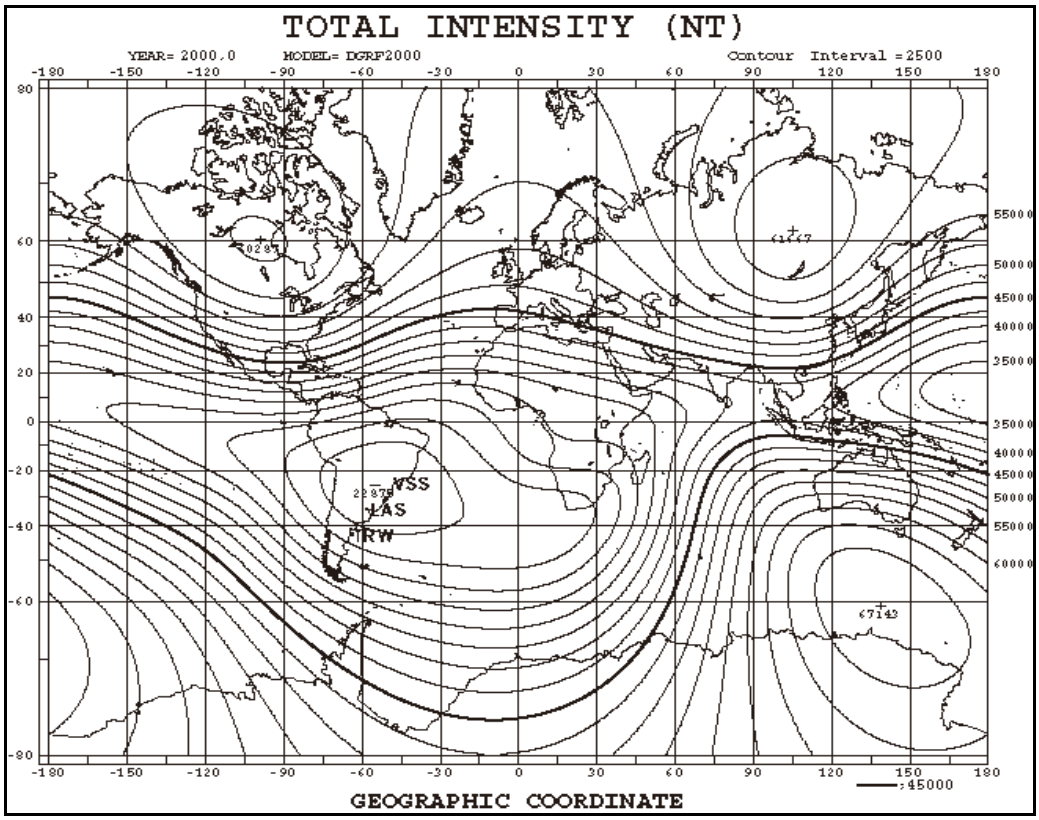



**FIGURA 1**

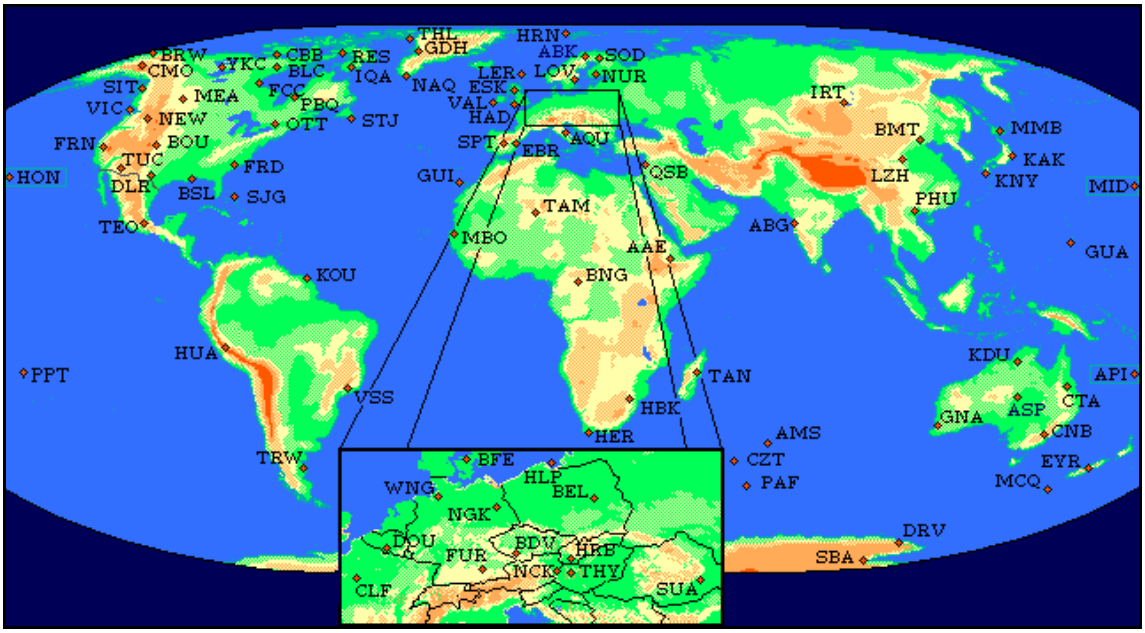


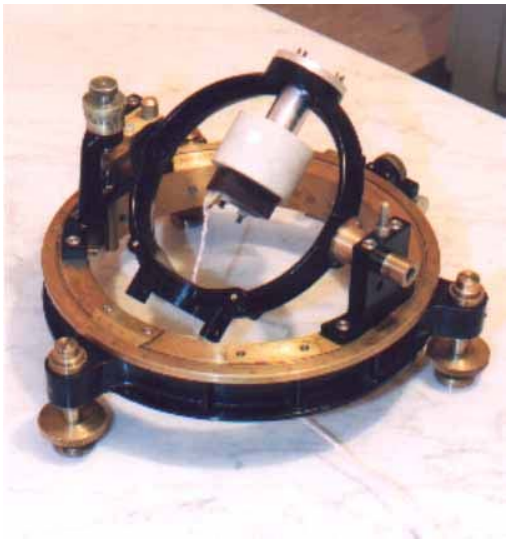

***FIGURA 2***

In 2000 Dr. Jean Rasson installed a second group of flux-gate variometer sensor of D, I, and F with the same temporal resolution, 1 min. The absolute measurement of base line are determinated by flux-gate theodolite (See the Fig 10 on page 5), also produced by RMI.
Figure 3 shows an aereal view of TRW, and figure 4 the houses of sensors (big house in midle of figure 4) and absolute determinations at the side of figure 4.

**FIGURE 3**

**FIGURE 4**

The followings figures 5 and 6 shows the flux gate sensors of D and I, and for D, I and F respectively, all with a temporal resolution of 1 min.



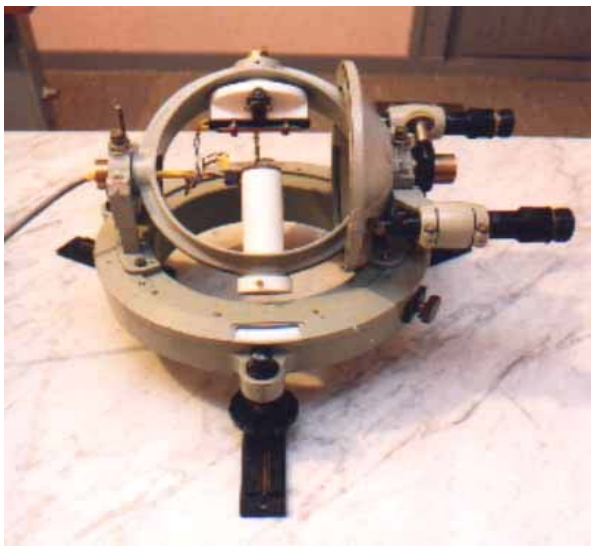


**FIGURE 5** **FIGURE 6**

The LAS obsevatory begun in year 2003 the digital record of F by means of a proton precession absolute magnetic magnetometer, with a temporal resolution of 1 min. Figures 7 and 8 shows the house and the digital system respectively.

***FIGURE 7*** ***FIGURE 8***

One proton precession absolute magnetic magnetometer is used as a variometer for field surveying. This instruments is similar to the LAS-F system. The mean life of batteries are 15 days or more if are supplied by electric recharge. Figure 9 shows this system.

The absolute measurements of D and I are made by a flux-gate theodolyte shown in figure 10. One are in TRW an the other are in LAS. This instruments are composed by a theodolite standart plus a flux-gate sensor atttached over the telescope with the property of paralelism of their axis.

**FIGURE 9**

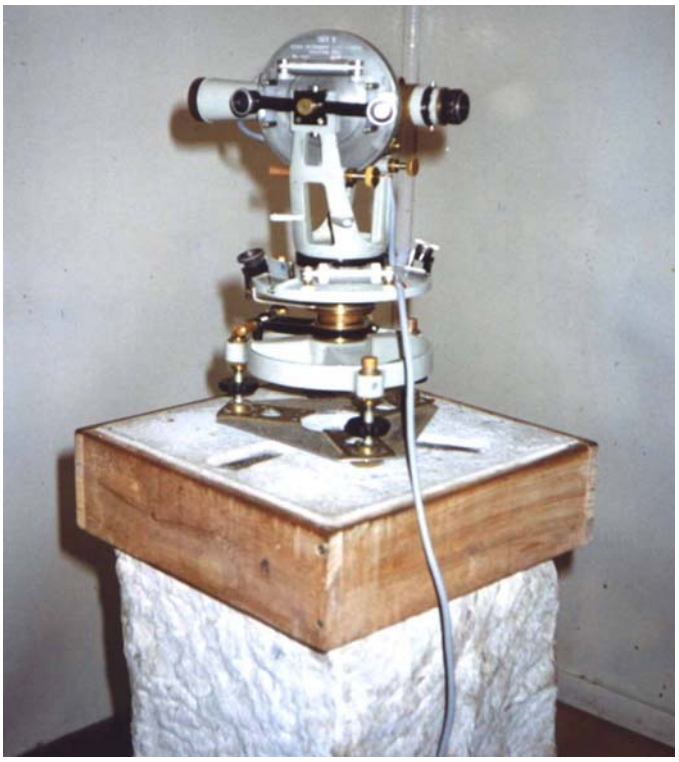


**FIGURE 10**

***THE SUN-EARTH RELATIONSHIP, THE TRW AND LAS MAGNETIC OBSERVATORIES AND THE HELIOPHYSIC YEAR 2007***.

In the 2007 year possibly will begin the minima between of 23 to 24 solar cycle. Different solar processes are important in the systems Sun-Earth. The geomagnetic observatories network is one of the different systems

for detect the phenomena at surface levels of processes in the magnetosphere cavity, ionosphere and their coupling with solar wind. The SAA have a particular interest because different processes take a place and we can observe them. The slowly change of focus, the low value of total magnetic field intensity observed at the surface and the effect of ecuatorial electrojet, are the fenomena continuosly detected in the geomagnetic observatories in the SAA. Superposed to these effects, we can observe other phenomena, as coronal mass ejection (CME), flares and fast solar winds borning in the coronal holes.
Recently, on January 20 to 22, 2005, we observed in the digital records (1 min of temporal resolution) of VSS, LAS, and TRW, the magnetic storm effect of a CME.
The solar wind parameters detected by the SOHO sonde, characterized by velocity and proton density, between January 20 and 22 of year 2005, corresponding to this coronal mass ejection are shown in figure 11. From this figure one can observe in order that to produce an appreciable effect due to the coronal mass ejection on digital records of the Earth Magnetic Field, both velocity and proton density must have a coincident maximum.

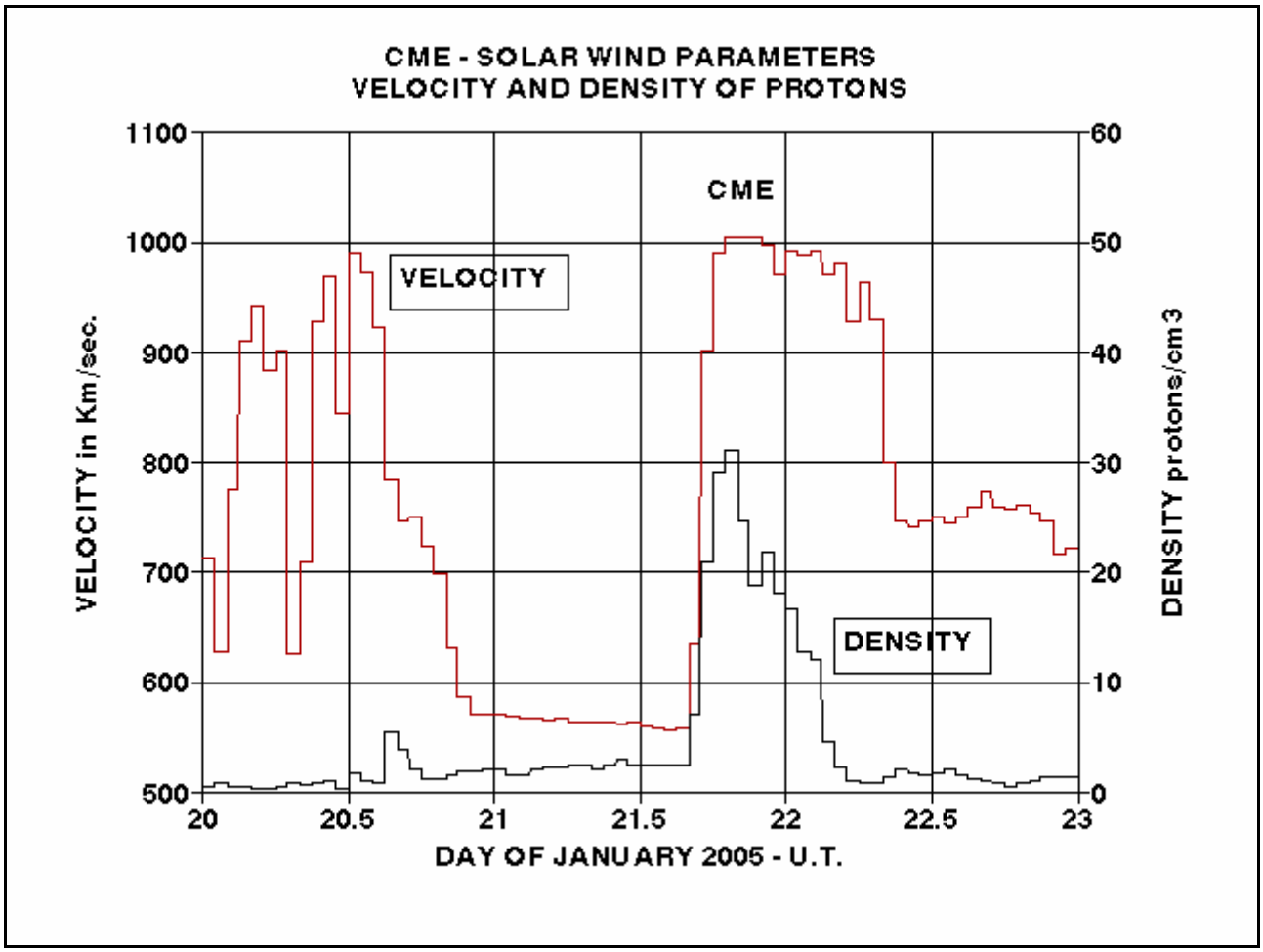



**FIGURE 11**

The magnetic storm recorded at VSS, LAS and TRW during January 2005 is shown in figure 12. The absolute amplitudes of this geomagnetic event are the followings: VSS: 236.6 nT, LAS: 205.4 nT and TRW: 205.2 nT, presenting VSS an amplitude 15 % larger than LAS and TRW. This posibly are due to ionospheric-Van Allen Rings coupling systems allowing a deeper penetration of particle flow over the SAA region. The SAA effect is important, since would be expected smaller values while we move to subpolar latitudes (Lat. < -60º), place where then increases notably . It is observed the amplitude not decreases at TRW Observatory , indicating a behavior which will be studied with detail, since TRW is located in the focus of Sur Hemisphere ionospheric currents system.

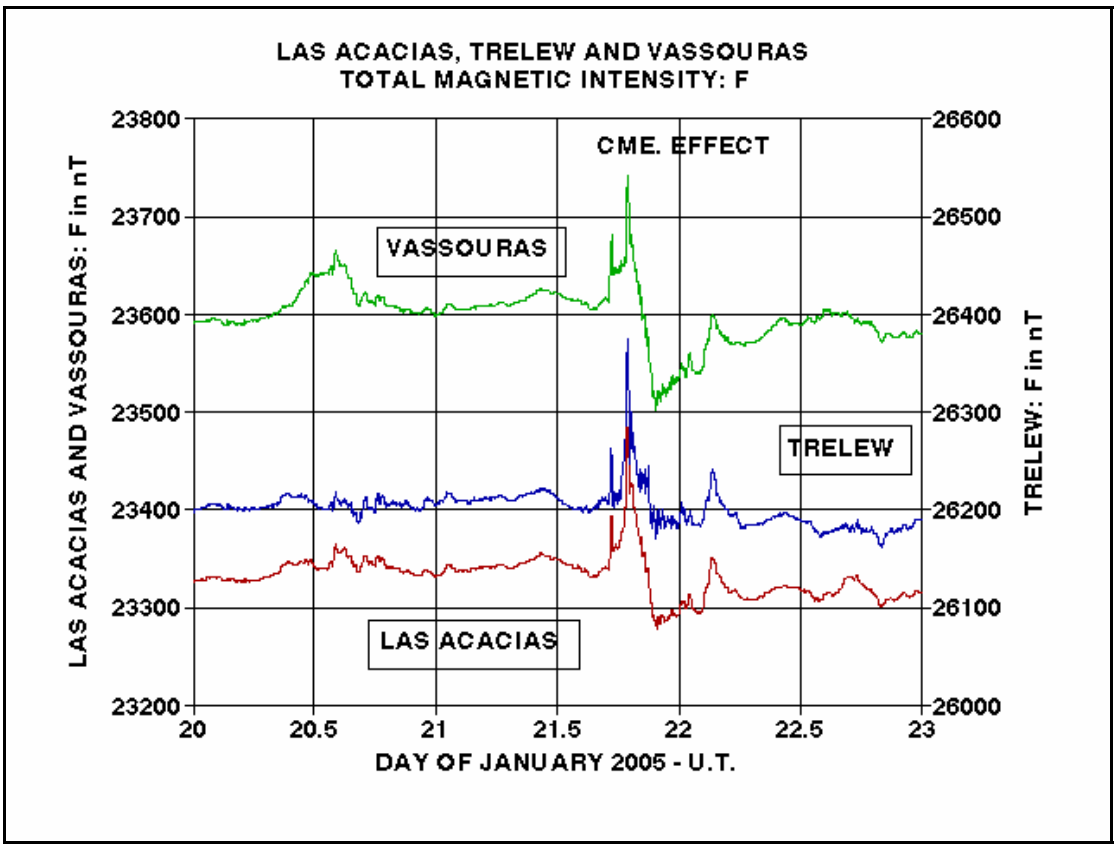



**FIGURE 12**

Other importanat results of the figure 12 is the absolute value of F at LAS, wich is less than VSS, detected by the model of Geomagnetic Reference Field, IGRF (International Geomagnetic Field 2000 model) for the epoch January 22-23, 2005, but not in the same amount, VSS = 23386 nT; LAS = 23377 nT; and TRW = 26283nT. The bias was in VSS = +212 nT, in LAS = -45 nT and in TRW = -81 nT.

At this moment, there are two very important cuestions to answer:
a)The DGRF 2000 ( Definitive Geomagnetic Reference Field ) representation have sufficient adjustement for the observed bias?
b) The following model IGRF 2005.0, for the interval 2005-2010, adjust in a better form the observation data, or it's necessary to extend to 14$^{th}$ order the Spherical Harmonics model?

*ACE SATELLITE DATA UTILITY FOR THE STUDY OF SOUTH ATLANTIC GEOMAGNETIC ANOMALY.*

This satellite provides an excellent data for correlated solar parameters to geomagnetic total intensities regitered in Las Acacias and Trelew magnetic observatories.
Some examples are the studies related on the different shocks observed by ACE satellite and the storms registered by these observatories located in the South Atlantic Anomaly SAA (see fig. 1). The followings figures 13 to 20, demostrates the importance of ACE satellite recorded data on the detection of different forms of geomagnetic storms observed at Trelew and Las Acacias.
The most important results is the importance of both situations of increasing density and high velocity over geomagnetic field for produce a very important magnetic storm. This can be observed directly from figures 13 to 16. It is necessary a high velocity and increasing density for produce a magnetic effect over magnetic obervatories sensors of LAS and TRW.

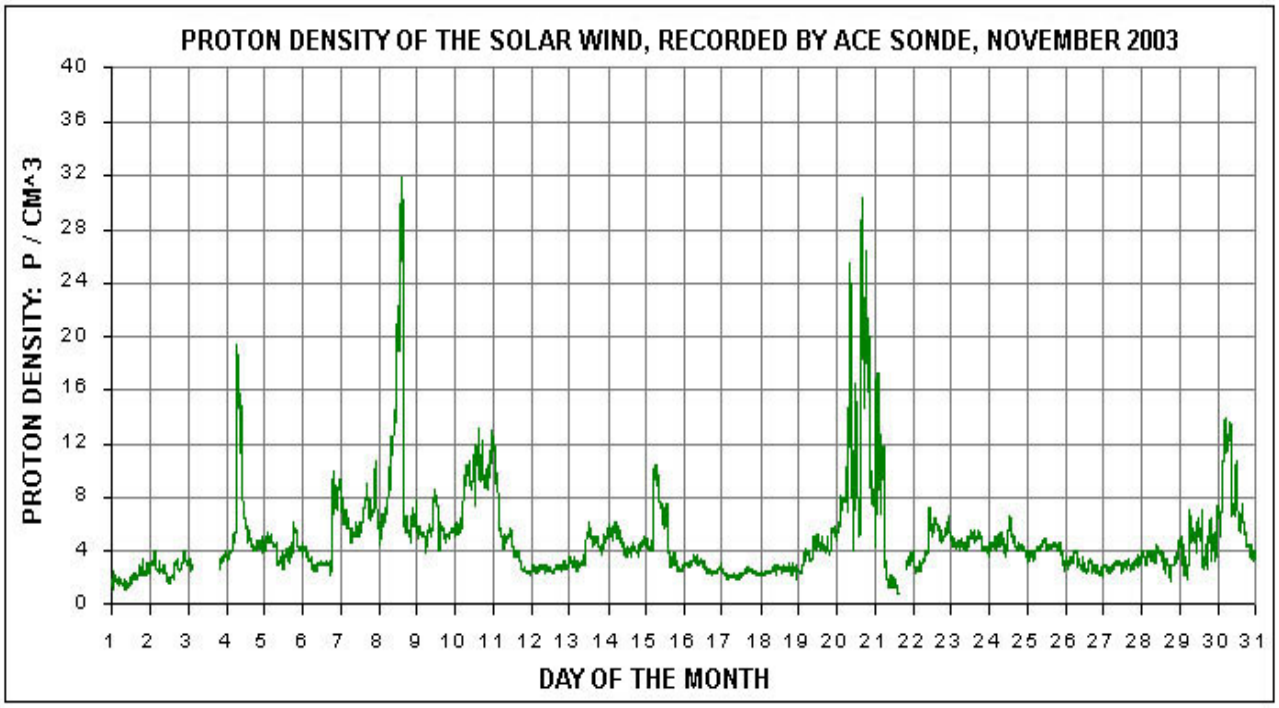



**FIGURE 13**

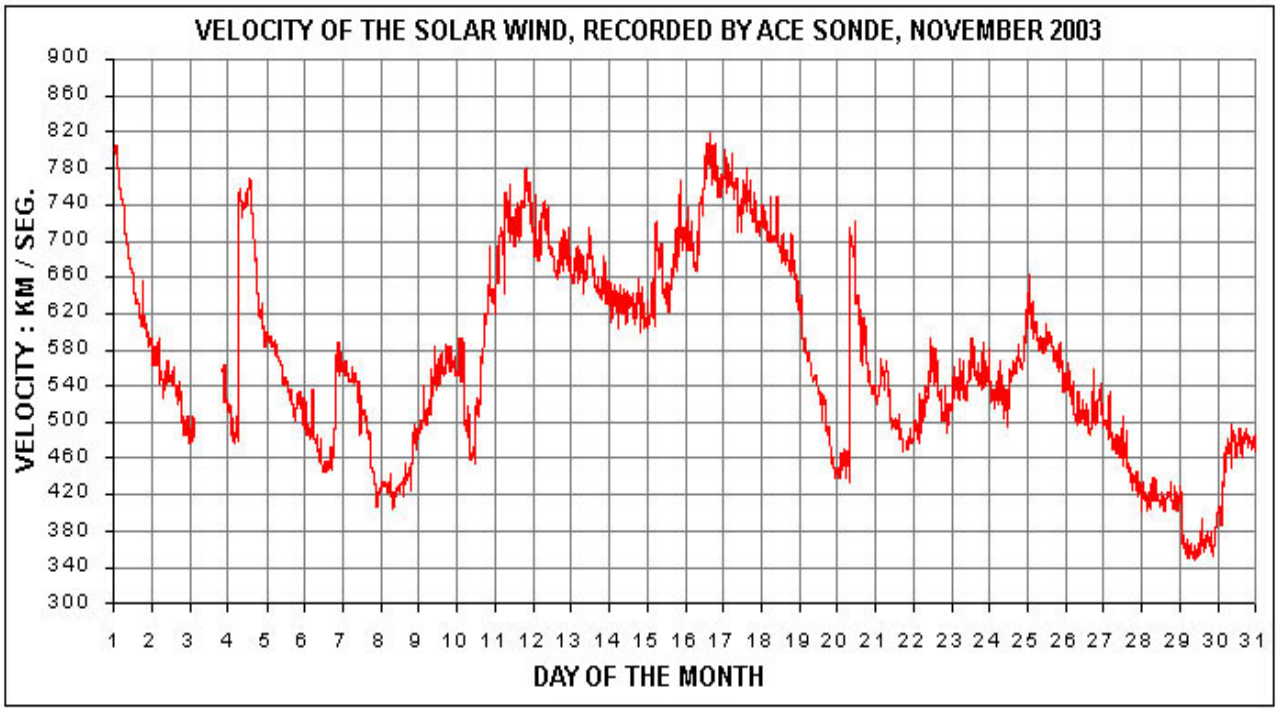



**FIGURE 14**

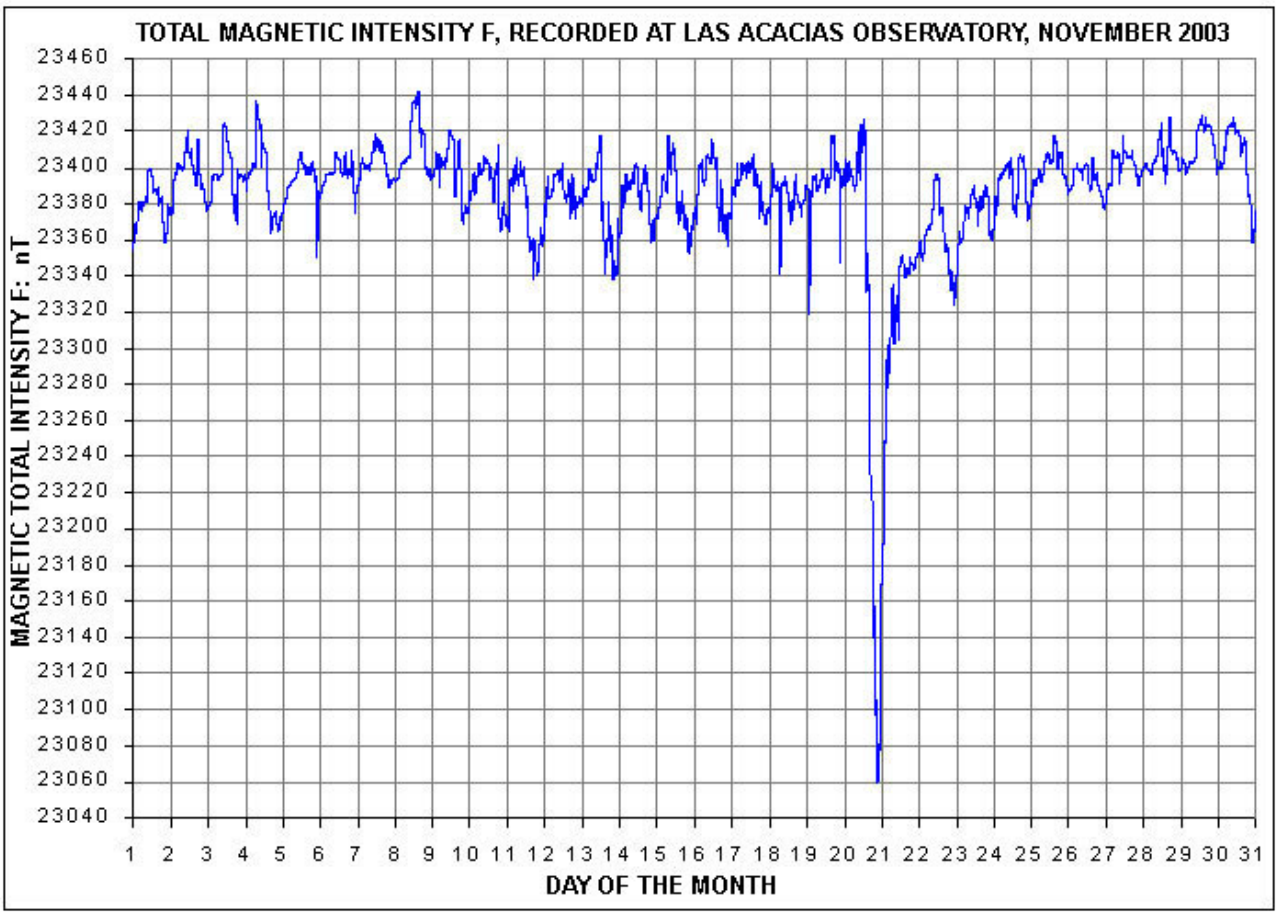



**FIGURE 15**

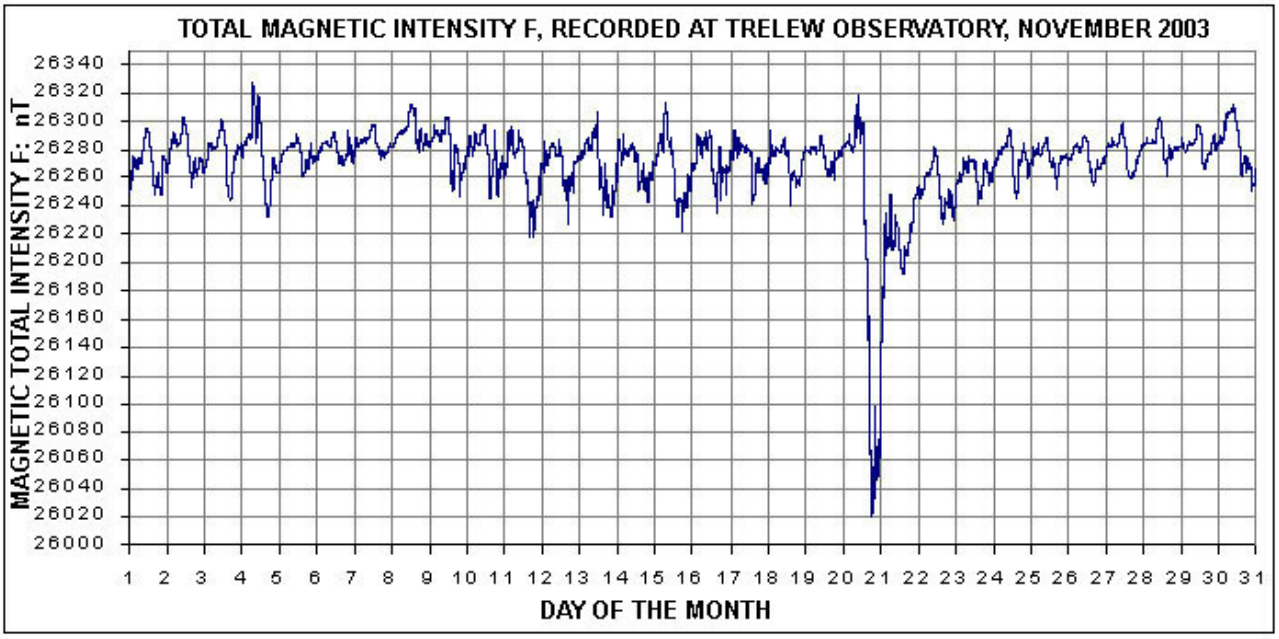



**FIGURE 16**

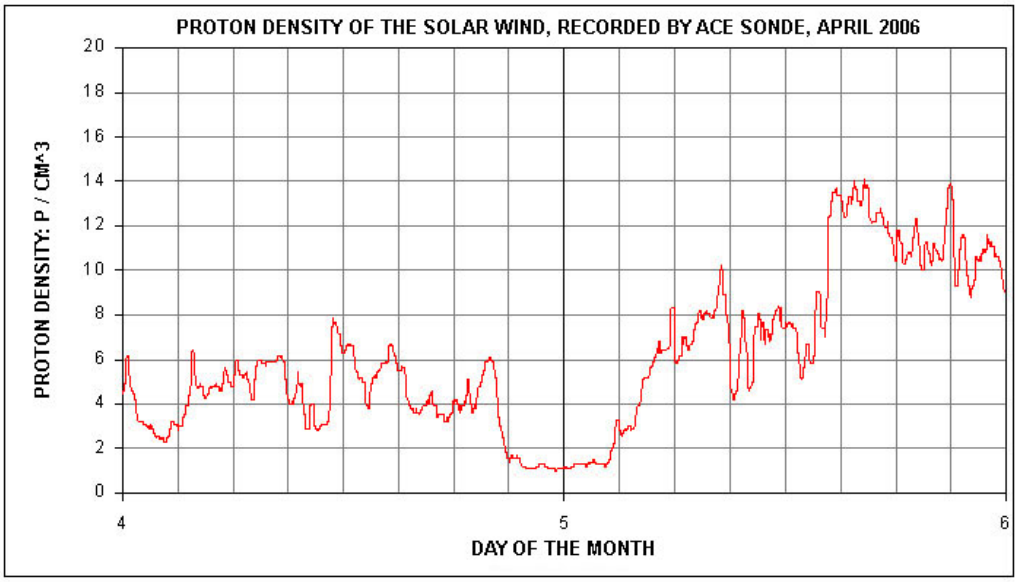



**FIGURE 17**

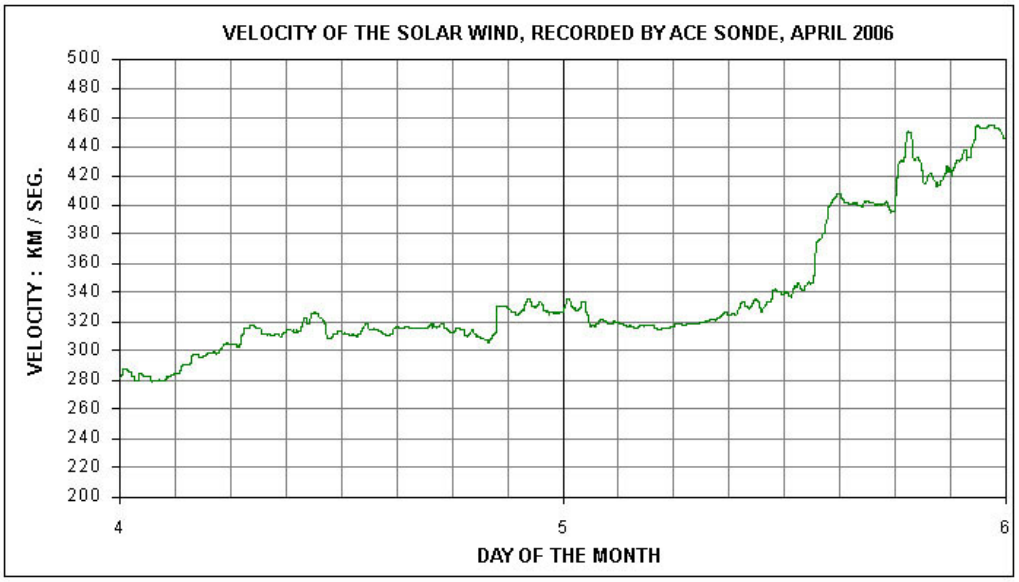



**FIGURE 18**

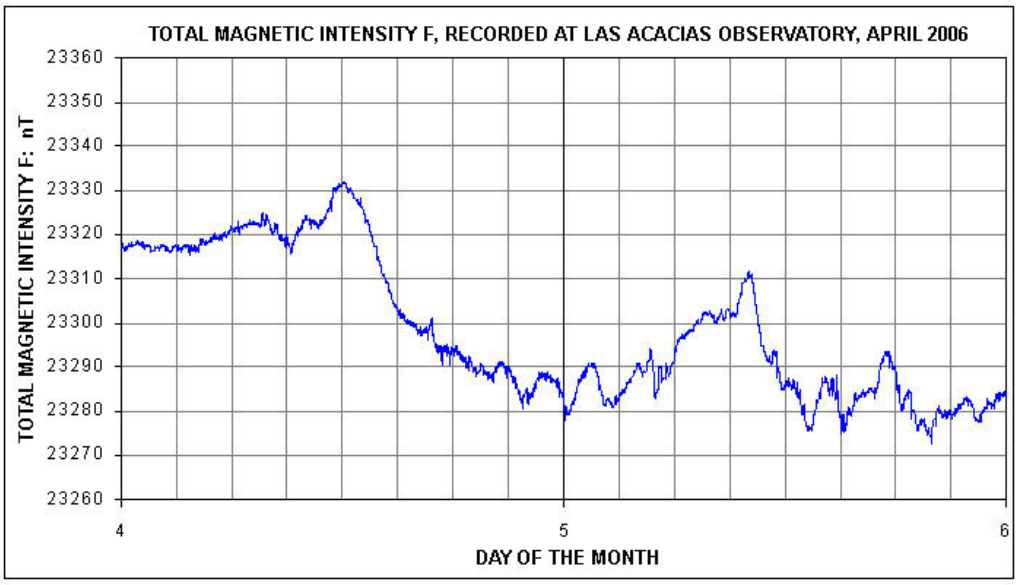



**FIGURE 19**

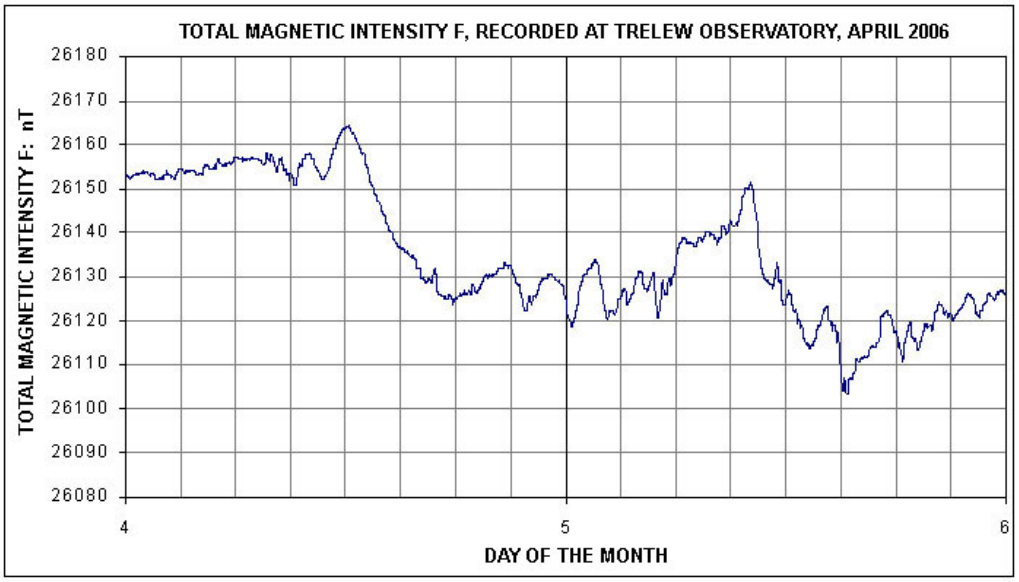



**FIGURE 20**

The SAA appears in a region just over Buenos Aires Province, Argentine. The absolute values observed in Las Acacias are below from Vassouras Magnetic Observatory at Brasil (Fig 1 and 2). At Las Acacias is 23300 nT and for Vassouras is 23600nT up to day. This is a very low total magnetic field at surface. Very important and possible efects of cosmis rays, and fast solar protons and electrons, penetrates to lowers levels of atmosphere and produce biological proceses in the biosphere system. The constinuosly data base of ACE satellite, magnetic observatories and meterological systems, are very important for understanding the processes of coupling solar wind – magnetosphere – troposphere and biosphere systems.

THIS REPORT WAS PREPARED BY JULIO CESAR GIANIBELLI AND NICOLAS QUAGLINO.
GEOMAGNETIC AND AERONOMIC DEPARTAMENT
FACULTY OF ASTRONOMICAL A ND GEOPHYSICAL SCIENCES.
PASEO DEL BOSQUE – 1900 LA PLATA – ARGENTINA.
La Plata 05/05/2006 ALL FURTHER INFORMATION PLEASE SEND A E-MAIL TO: geomagnetismoyaeronomia@yahoo.com.ar
**geophgianibelli@yahoo.com**
**geofisicogianibelli@yahoo.com.ar**

**ADDRESS :**
JULIO CESAR GIANIBELLI
OBSERVATORIO ASTRONOMICO DE LA PLATA
PASEO DEL BOSQUE S/N – 1900 LA PLATA – ARGENTINA
geophgianibelli@yahoo.com